
Aguaytia
ENERGY

Aguaytía Energy Group

Pilot Project in Iquitos

Mototaxis Conversion System to

Bi-Fuel Gasoline/LPG

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Alejandro Fort

Gas Marketing Manager

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1. Summary

Summary

- **In Iquitos, Rickshaws represent 33% of the minor automobile market, with 8,000 registered units.**
- **Rickshaws daily average leaded gasoline consumption is 2.55 gallons. (20,400 gallons per day) .**
- **LPG is more economic and cleaner than Leaded Gasoline. Returns on Investment of the conversion will be in less than a year, furthermore, the Mototaxi driver saves US$0.75 per day.**
- **84 Octane Gasoline contains Lead that is highly pollutant, (3,23 grams/gallon), produces 23.7 tons per year, exceeding the international standards.**

Summary

- **The financing system will be performed taking in consideration the following:**
  - **Payment will be included in the fuel's charge (LPG). In this manner the driver will pay the same amount as with gasoline. The amount difference will pay the financing.**
- **The LPG supply for the Mototaxis will be in 5 kgs cylinders throughout the distributors of the city.**

2. Economic Analysis

2.1 Economic Analysis Premises

Premises
Pilot Plan

- **Requires a Emissions Control Center and a Conversion Shop .**
  - **The necessary equipment is as follows:**
  - **<u>Conversion Shop:</u>**
    - **1,500 Conversion Kits to LPG per year**
    - **2 Emissions test equipment.**

- **Each interested Mototaxi Association will sign a Financing and Supply Contract.**
- **It will be charged the same price of gasoline for LPG until the conversion is canceled. Daily savings of $0.75 will by new income for the Mototaxi driver and the Association.**

Premises

MOTOTAXI PILOT PROJECT							
CONVERSION AND EMISSIONS SHOP				**MOTOTAXI OWNER**			
Investment:							
Working Capital	$ 300,000			Conversion	$ 240		
Testing Equipment	$ 28,000			Equipment	$ -		
Tools	$ 10,000			Other	$ -		
Total	$ 38,000			Total	$ -		
Total Investment	$ 338,000			Total Investment	$ 240		
Conversion Shop	Unit Costs	Annual					
Annual Volumen	1500			Annual Volumen		1	
					Savings/day	Days	Year 1
Revenue	$ 240	$ 360,000		Revenue	$0.75	330	$ 248
Costs	$ 200	$ 300,000		Costs			$ 240
Margin	$ 40	$ 60,000		Margin			$ 8
Overhead		$ 4,000		Overhead			$ -
EBDIT		$ 56,000		EBDIT			$ 8
Depreciation		$ 3,800		Depreciation			$ -
Earnings before Taxes		$ 52,200		Earnings before Taxes			$ 8
Income Taxes		$ 15,660		Income Taxes			$ -
Net Earnings		$ 36,540		Net Earnings			$ 8
Cash Flow Analysis:				Cash Flow Analysis:			
Net Earnings		$ 36,540		Net Earnings			$ 8
Depreciation		$ 3,800		Depreciation			$ -
Cash Flow		$ 40,340		Cash Flow			$ 8
Investment		$ 338,000		Investment			$ 240
Return on Investment		12%		Return on Investment			3%

2.2 Economic Analysis
Conversion to Bi-Fuel System

CHART N° 1
Economic Analysis for the Acquisition of a New Gasoline Mototaxi versus the Bi-Fuel System Gasoline/ LPG

Mototaxi	Gasoline	LPG (*)	Bi-Fuel System
Acquisition Cost	3,850 US$/unit(**)	240 US$/unit	4,090 US$/unit
Rent payment	7.25 US$/day		7.70 US$/day
Saving in Fuel		0.75 US$/day	
Pay Out in working days	531 days	319 days	531 days

(*) Chart N° 5 "Economy in the Conversion of a Gasoline Mototaxi to the Bi-Fuel System Gasoline/LPG

(**) Average price of a new Mototaxi in Iquitos city

CHART N° 2
Economy in the Conversion of a Gasoline Mototaxi to the Bi-Fuel System Gasoline/ LPG

	Gasoline	LPG
Daily route	180.04 Km/day	180.04 Km/day
Output	80.45 Km/gal	81.30 Km/gal
Fuel Cost	1.58 US$/gal	1.26 US$/gal
Fuel Consumption	2.24 gal/day	2.21 gal/day
Fuel Cost per Day	3.54 US$/day	2.78 US$/day
Annual Working Days	365 days/year	365 days/year
Annual Fuel Cost	1,291 US$	1,016 US$
Conversion to the Bi-Fuel System Cost		240 US$
Saving in fuel using LPG		274 US$/year
Pay Out		11 months

2.3 Benefits

Benefits

- **Reduction in fuel and maintenance costs using LPG.**
- **Additional earnings for the owner and for the driver of the Mototaxi using LPG.**
- **Use of 5 LPG kgs cylinder with regulator .**
- **Optimum LPG distribution system to ensure supply.**
- **Reduction of pollution due to the use of LPG instead of Leaded Gasoline.**

3. Market Analysis

3.1 Market Analysis
Demand

Demand

- **The average demand from January to March 2002 of domestic LPG in Iquitos was 4,492 gallons/day.**
- **The average demand of 84 Octane Gasoline for the Mototaxi market (8,000 units) is 20,400 gallons/day.**
- **It is estimated that in a period of 5 to 7 years, it would be possible to take over more than 60% of the market presently using Leaded Gasoline.**

3.1 Market Analysis Proposal

Proposal

- **Aguaytia Energy has a potential to supply the amazon region with 58,800 gallons per day.**

- **GLP Amazonico, the LPG bottler company located in Iquitos, supplied by Aguaytia Energy has a storage capacity of 60,000 gallons. Also, owns a tanker for bulk sales, and is feasible to be used for LPG bulk supplies to future Gas Stations .**

4. Technical Aspects

4.1 Technical Aspects
Description of the Fuel

Description of the Fuel

- **The Liquefied Petroleum Gas (LPG) is one of the "Alternative Fuels" for the vehicle transportation .**
- **LPG is a Gaseous fuel composed of a mixture of Butane and Propane (40% and 60% respectively).**
- **For vehicle use, LPG should have at least 97 Octane.**
- **LPG specific quality characteristics for its vehicle use is established in the NTP 321.114.2001 of INDECOPI. (Peruvian Norm)**

4.2 Technical Aspects Advantages

Technical Advantages

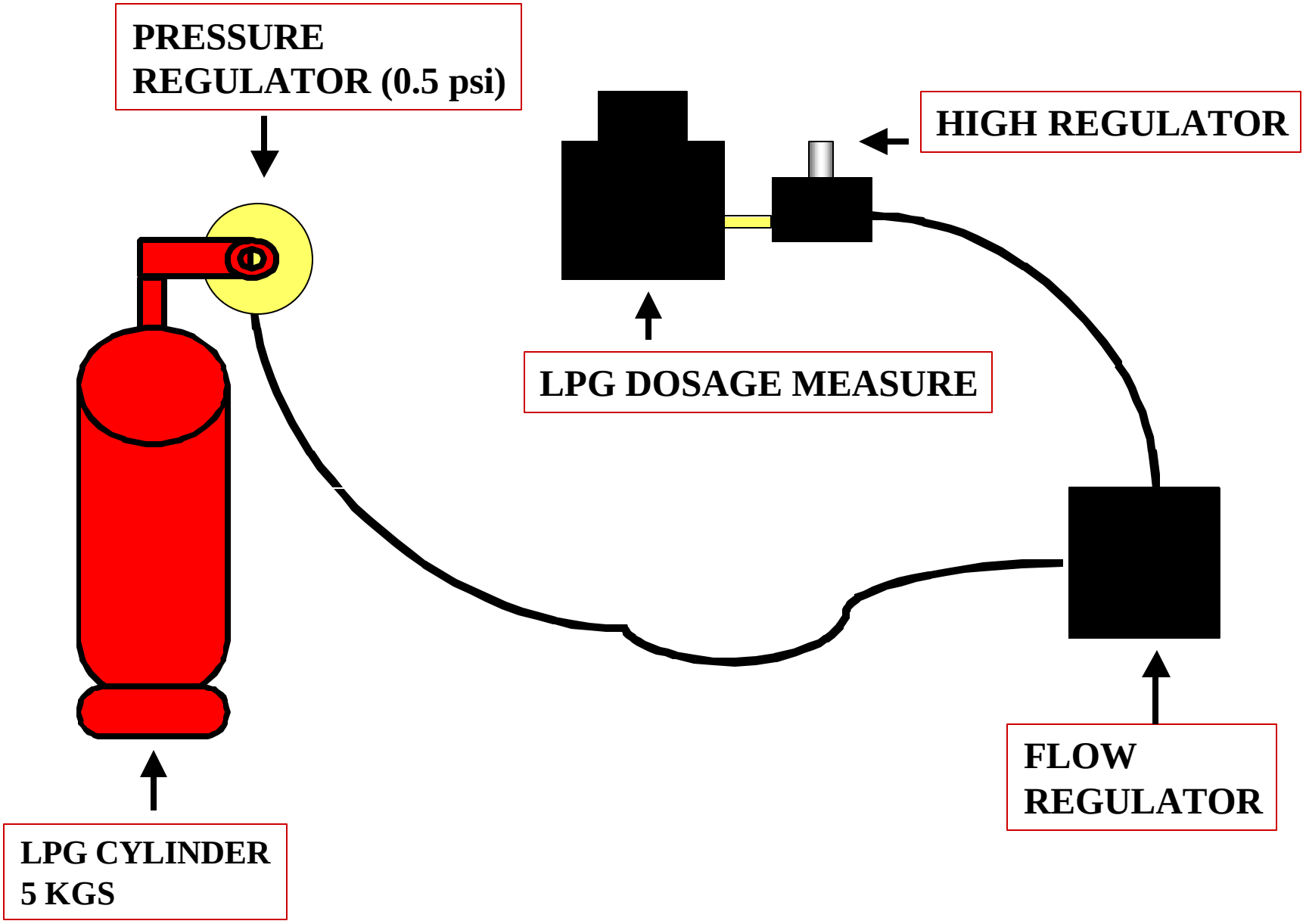
- **High Octane (97 to 103 octane).**
- **Less maintenance costs (reduction of fuel's particles deposits and less oil lubricant degradation).**
- **Extends the life time of the spark plug.**
- **The engine's functioning is smoother with out "rattle".**
- **The noisy level is reduced by 15% in comparison with gasoline; and 60% compared with diesel.**
- **Significant reduction in the air pollution and improvement in the population health.**

4.3 Technical Aspects
Conversion Kit Parts

Conversion Kit

- **The Bi-fuel gasoline/LPG system uses independently one of these fuels (one per time) of the two fuel tanks: LPG or Gasoline.**
- **The system operates with a Close Loop, avoiding the fuel to leak.**
- **LPG high efficiency allows the engine a better performance (power loss less than 10%) in comparison with the leaded gasoline efficiency (power loss of 60%).**

MOTOTAXI TO LPG – CONVERSION KIT



4.4 Technical Aspects
Installations Safety

Safety

- **The LPG conversion kit operates with a close and safety system. Contains odorized LPG permitting to smell the product in case of leaks.**
- **In the event of a possible Mototaxi collision, the explosion of the gas system is remote.**
- **The tank supports the collision, and the safety system closes immediately to avoid gas leaks.**
- **The tanks that storage LPG have been tested in high efforts conditions.**
- **The short range of inflammability (2.2% - 9.6%) permits the dissipation of the LPG in the environment versus the range of gasoline inflammability (1.0% - 7.6%).**

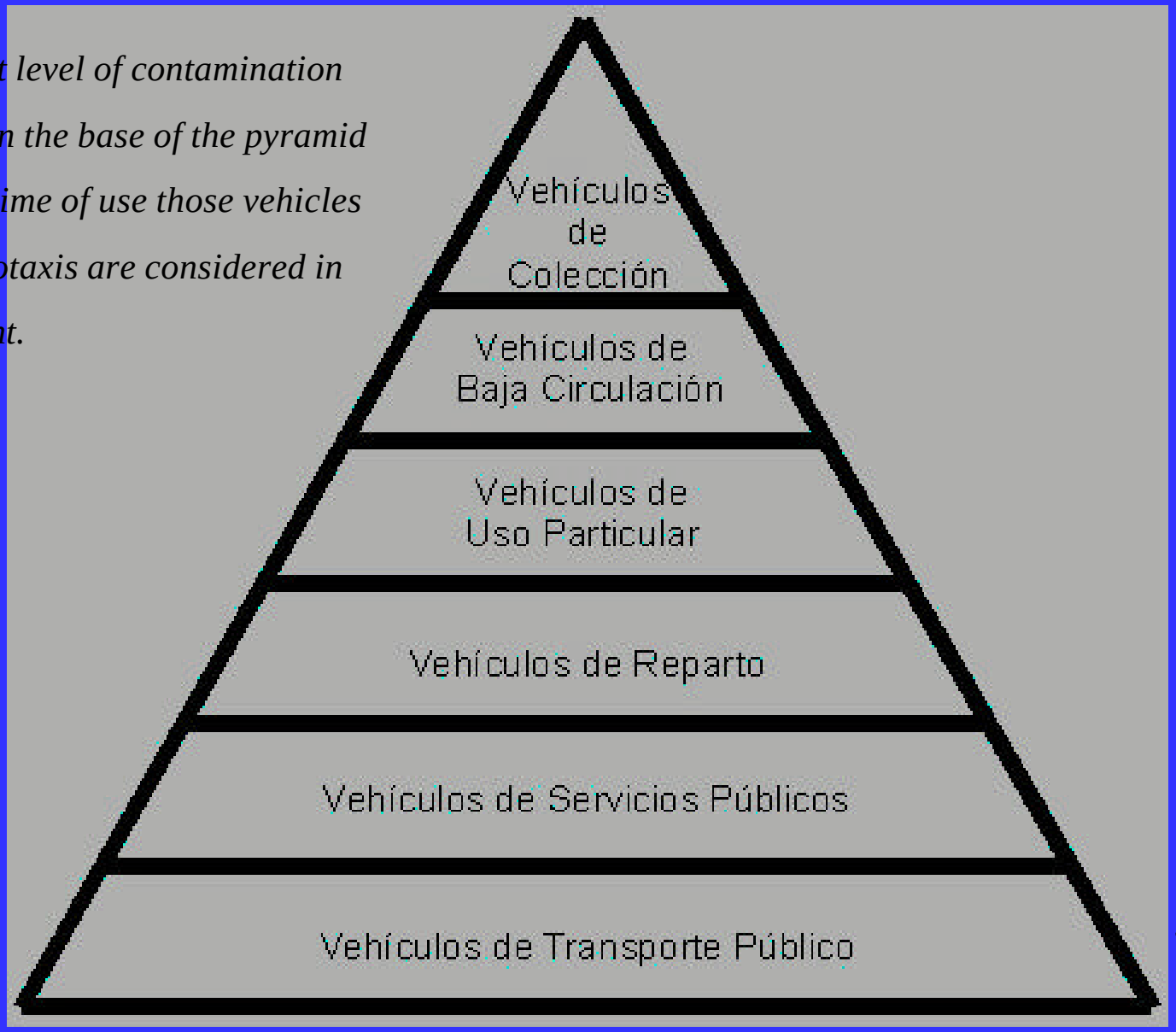
5. Environmental Aspect

Environment

- **LPG has more environmental benefits and a higher efficiency in comparison with Gasoline or Diesel.**
- **Due to its efficiency, LPG issues less pollutant quantities when it is combustioned.**
- **Permits a reduction of 100% in Lead emissions and in Sulfur Oxide (SOx). Aguaytia's LPG does not contain lead nor sulfur.**
- **The emissions of Nitrogen Oxide (NOx) are reduced in 80% in comparison with Gasoline and 90% with Diesel.**
- **The pollution with Carbon Monoxide (CO) is reduced in 80% in comparison with Gasoline.**

VEHICLE CONTAMINATION PYRAMID

**The highest level of contamination is located in the base of the pyramid due to the time of use those vehicles have. Mototaxis are considered in this segment.*



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6. Regulation

Regulation

- **For the implementation of this project it is necessary to develop a program for the vehicles' technical revisions.**
  - **First Stage: Promulgation of a municipal bylaw that calls during 90 days for technical revisions of Gasoline vehicles to verify their conservation status and gas emissions. (Senati Iquitos - Maynas Municipality – Transportation Ministry – National Police).**
  - **Second Stage: Implementation of the obligatory technical revisions for 120 days (could be performed by Senati Iquitos). In this stage vehicles will be certified. Depending on their contamination level, they will pay the annual circulation authorization.**
  - **Third Stage: Creation of an Ecology Police Group for the compliance of the circulation authorizations and implementation of a Transportation Station.**

Regulation

- **It is required that the corresponding governmental entities establish a Normalization and Regulation Procedure for the LPG installation systems, including the following related activities:**
  - **Conversion Garages.**
  - **Technical Revisions.**
  - **Technical Norms for the Conversion Kits.**
  - **Others Norms and Rules.**


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